Emerging trends in the generation, transmission and protection of Traditional Knowledge

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I. Introduction

The knowledge, innovations and practices of Indigenous Peoples is the foundation of much of the world's modern science and continues to provide a significant and valuable source of inputs. It is increasingly recognized that unlocking the potential of traditional knowledge can help modern society address significant challenges ranging from climate change and sustainable agriculture to new pathways for sustainable development for ensuring the livelihoods of Indigenous and local communities.

Yet, traditional knowledge is rapidly disappearing. UNESCO estimates that at least 43% of 6,000 languages spoken in the world are endangered most if not all of these are Indigenous languages and represents a great loss of TK. Around a quarter of the world's languages have fewer than a thousand remaining speakers, and linguists generally agree in estimating that the extinction of at least 3,000 of the 6,909 languages listed by *Ethnologue*, or nearly half, within the next century is virtually guaranteed under present circumstances[2].

Gaps in human development, scant economic opportunities for Indigenous Peoples, education systems that do not respect its value or undermine traditional cultures, inadequate land rights, urbanization, the migration of youth, the passing of elders, and a lack of respect for traditional knowledge as a knowledge system are among the factors causing this loss. Addressing these threats is complex.

There is little doubt that the conservation of cultural diversity and the retention of traditional knowledge are key issues for a world embarked on a path of globalization and cultural homogenization at a speed and rate of acceleration scarcely conceivable at the time of the United Nations global conferences only ten years ago.

Linking and networking the emerging body of successful global experience would promote Indigenous leadership and enterprise, provide valuable ideas for mainstream education, training and research and develop more effective interventions.

This paper complements the note issued by the Secretariat of the Permanent Forum on Indigenous Issues on the forum's theme for 2019, *Traditional knowledge: generation, transmission and protection,* by providing examples that highlight successful strategies for harnessing the potential of traditional knowledge, and ensuring its continued generation, transmission and protection. The examples underline the implication of the loss of this knowledge to the holders and the wider world, the importance of sustaining the dynamism of traditional knowledge and know-how in Indigenous communities, and how traditional knowledge has emerged onto the forefront of the debates on sustainable development.

II. Background and context

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[2] See https://www.ethnologue.com/endangered-languages.

Traditional knowledge is a unique cumulative body of knowledge and practices related to the natural environment of a specific geographic area developed by a people over generations. It represents a history of experiences, careful observations and experimentation. It is embedded in culture, spirituality and world views and expressed in stories, songs, proverbs, customary laws and language. It is shared and passed down through the generations orally and through cultural practices and ritual.

These sets of understandings, interpretations and meanings are attached to language, naming and classification systems, and resource use. The Saami reindeer herders for instance have over 200 analytical expressions for snow and snow change in their language, and over 400 for reindeer.[3] These represent an integral part of their traditional knowledge and are used by the herders in their everyday lives.

Traditional knowledge informs decision-making on the fundamentals of day-to-day life ranging from hunting and fishing to agriculture and animal husbandry to the interpretation of meteorological and climatic phenomena and the tackling of illnesses and disease. It is the basis for food preparation, education, environmental conservation and the wide range of activities that define societies in many parts of the world. All members of a community have traditional knowledge- elders, women, men and children.

Traditional knowledge systems are dynamic as new knowledge is continuously added, adapted and altered. The systems innovate from within and internalize use and adapt external knowledge to suit local situations and thereby ensure communities' resilience to change.

Indigenous Peoples' complex traditional knowledge systems have been critical to the preservation of biological diversity, the sustainable use of natural resources and the protection of the ecological integrity of ecosystems. Indigenous peoples' rights to their lands, territories, resources and self-determined development underpin the survival and generation of traditional knowledge. Thanks to Indigenous Peoples' knowledge and sustainable practices, the lands and waters they continue to manage contain over 80 per cent of the Earth's biodiversity.[4]

Yet Indigenous Peoples' lands are under threat from extractive industries, large-scale infrastructure development, monocrop agriculture and cattle raising; and biological diversity is facing a dire future. According to the World Wildlife Fund's (WWF) *Living Planet Report 2014*, the planet lost 52 percent of its biodiversity between 1970 and 2010, and in Latin America biodiversity diminished by 83 percent during that same period.

III. Emerging trends

Indigenous Peoples are responding to these challenges. In the last decades movements seeking autonomy, respect for Indigenous worldviews, and influence in political processes have gained recognition at a global, regional and national scale. Their advocacy has placed Indigenous and community conserved areas or **ICCAs** at the center of the global environmental conservation debate, led national governments to recognize the rights of nature and autonomous governed territories. These

[3] http://reindeerherding.org/wp-content/uploads/2013/06/EALAT-Final-Report.pdf

[4] https://www.thegef.org/sites/default/files/publications/indigenous-community-biodiversity_0.pdf

measures have the potential to curb the loss of biodiversity, and invigorate the protection, transmission and generation of traditional knowledge for the future. They also contribute to governments' commitments to address global climate change, and to meet international targets like those set by the Convention on Biological Diversity's Aichi 2020 Targets relating to protected areas (Target 11), ecosystem services (Target 14), and the protection of traditional knowledge (Target 18).

In 2018, Indigenous Peoples in the Peruvian Amazon established the **Wampis Nation**, an autonomous territorial government to defend their livelihood from the increasing pressure from extractive industries. The governance of the Wampis Nation is based on the statute, which sets out the Wampis' vision for the future in all areas of life including spirituality, education, language and recovery of ancestral place names. Their autonomous government covers nearly 14,000 km2.[5] Likewise, in 2017 the Guaraní of Charagua Iyambae[6] officially became Bolivia's first autonomous Indigenous and aboriginal farming community after years of fighting to regain their self-governance and territory.

The concept of ***Buen Vivir*** (or good life/good living) in Latin America offers a paradigm shift from Western values centered on the individual and capitalism to one rooted in the cosmovision or worldview of Indigenous Peoples, focused on the collective and harmony between people and nature. *Buen Vivir* acknowledges the importance of preserving, protecting, and respecting the natural world and the rights of nature. Indigenous knowledge systems guide its practices where human beings are no longer the only ones who have values and rights. In 2008 and 2009 respectively, Ecuador and Bolivia legally recognized the rights of nature by including the concept of *Buen Vivir* in their national constitutions.

Over the last decade international attention to the value and global benefits of **ICCAs** has grown as they are a store house of traditional knowledge, biodiversity conservation, sustainable land and resource management, and people's well-being. Efforts to raise awareness and support their recognition globally -outside of the framework of formal government-recognized protected areas -have emerged in institutions around the world. The Global Support Initiative for Indigenous Peoples and Community Conserved Areas (ICCA-GSI) is one such multi-partnership that aims to strengthen the national enabling environments in 26 countries to support appropriate recognition and protection of ICCAs[7].

IV. Traditional knowledge and international frameworks

Important gains have been made in the recognition of Indigenous Peoples' rights as noted in the human rights bodies -the International Bill of Human Rights, international instruments such as the International Labour Organization's Indigenous and Tribal Peoples Convention, 1989 (No. 169), and in binding and non-binding agreements like the Rio Environmental Conventions; and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Article 26.1 in UNDRIP states: "Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired." The right to free prior and informed consent – essential to safeguarding the transmission of traditional knowledge- is enshrined in Article 19. And, in Article 31, UNDRIP recognizes

[5] http://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/01/STATUTE-OF-THE-AUTONOMOUS-TERRITORIAL-GOVERNMENT-OF-THE-WAMPIS-NATION-ENGLISH-ABRIDGED-1.pdf

[6] http://www.regionsunies-fogar.org/en/media-files/254-the-first-indigenous-autonomy-is-born-in-bolivia

[7] https://sgp.undp.org/about-us-157/partnerships/icca-gsi.html.

indigenous peoples' right to control, protect and develop their traditional knowledge and calls on States to protect these rights.

International institutions recognize that climate change, habitat loss and anthropogenic pressures threaten *in situ* biodiversity conservation and traditional knowledge systems around the world. In 2015, more than 150 world leaders adopted the 2030 Agenda for Sustainable Development including the **Sustainable Development Goals** (SDGs). Achieving the universally agreed goals requires transitions to less environmentally degrading, more resource-efficient, climate resilient development that reduces inequalities and brings multiple social, economic and environmental benefits for people over the long-term. The SDGs also provide an opportunity for raising awareness on the use of traditional knowledge and integrating it into development and environmental strategies.

Harnessing traditional knowledge practices is therefore an important piece to achieving SDG 13 on *Climate Action*, SDG 14 on *Life below Water* and SDG 15 on *Life on Land*. Moreover, given that 80% of the population in Africa and 65% in India depend on traditional medicine to help meet their health care needs[8], attention to traditional medicine will be essential to achieving SDG 3 on *Good Health and Well-being*.

In traditional medicine, knowledge is needed to understand the use of herbal remedies in treatment, the location of medicinal plants, the proper times for collection, the most useful parts, and the methods for preparation and storage of the medicines. The **Foundation for Revitalization of Local Health Traditions[9]** (FRLHT) in Bangalore, India is an example of how traditional medicine is being recognized, studied and used on a scale that can have societal impact. FRLHT is a scientific and research center for medicinal plants and the uses of local, tribal and ancient ayurvedic knowledge. The foundation makes full use of India's rich and diverse medical knowledge to serve health care needs in rural and urban India. FRHLT demonstrates the contemporary relevance of India's medical heritage.

Indigenous Peoples' capacity to adapt to environmental change is based on an in-depth understanding of the land and sea. Their resilience is rooted in traditional knowledge. As climate change increasingly impacts Indigenous landscapes, Indigenous communities are responding and adapting in unique ways. This kind of know-how is recognized within international frameworks, like the **Paris Climate Agreement**. In Article 7 governments acknowledge that action on climate adaptation …*should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.*

The recognition of the need to strengthen knowledge, technologies, practices and efforts of Indigenous Peoples and local communities related to responding to climate change led to the establishment of the Local Communities and Indigenous Peoples Platform (LCIPP). *The LCIPP is a platform for the exchange of experiences and best practices on climate change mitigation and adaptation based on traditional knowledge.* The operationalization of the platform at the 24th session of the Conference of the Parties

[8] http://apps.who.int/gb/archive/pdf_files/WHA56/ea5618.pdf
[9] http://www.frlht.org/

(COP 24) to the UN Framework Convention on Climate Change (UNFCCC) in Katowice, Poland, advances the Paris Agreement requirement that climate action be based on and guided by traditional knowledge.

At the national level, Nationally Determined Contributions (NDCs) outline what action countries will take to achieve the goals set out in the Paris Climate Agreement post-2020. The NDCs provide opportunities for countries to integrate their traditional knowledge systems in their responses to combat climate change. As noted by Indigenous advocates, in the case of Africa, traditional knowledge could help achieve the unconditional target of 15 percent that will be met with their own resources. However, out of the 44 NDCs submitted by African countries at the CoP24, only nine mention traditional knowledge[10]—indicating a need for greater attention on the importance of traditional knowledge at the regional and national levels.

The implementation of Article 8(j) on Traditional Knowledge, Innovations and Practices in the **Convention on Biological Diversity** has been key in advancing recognition, protection and transmission. Early in the life of the Convention, the Conference of the Parties at its Third Meeting in Buenos Aires in 1996, in its Decision III/14, "*Recogniz[ed]* that traditional knowledge should be given the same respect as any other form of knowledge in the implementation of the Convention." The work of the Working Group on Article 8(j) and Related Provisions led to the adoption of three indicators to monitor the status and trends in traditional knowledge: i) *status and trends of linguistic diversity and numbers of speakers of indigenous languages*; ii) *status and trends in land-use change and land tenure in the traditional territories of indigenous and local communities*; and iii) *status and trends in the practice of traditional occupations*.

The Working Group was also instrumental in the adoption of two guidelines -among others- the *Mo'otz Kuxtal Voluntary Guidelines* (2016) and the *Rutzolijirisaxik Voluntary Guidelines* (2018). The *Mo'otz Kuxtal Voluntary Guidelines* is for the development of mechanisms, legislation or other appropriate initiatives to ensure the *free, prior and informed consent* of Indigenous Peoples and local communities for accessing their knowledge, innovations and practices, for fair and equitable sharing of benefits arising from the use of their knowledge, innovations and practices relevant for the conservation and sustainable use of biological diversity, and for reporting and preventing unlawful appropriation of traditional knowledge. The objective of the *Rutzolijirisaxik Voluntary Guidelines* for the Repatriation of Traditional Knowledge Relevant for the Conservation and Sustainable Use of Biological Diversity is to facilitate the recovery of traditional knowledge relevant for the conservation and sustainable use of biodiversity.

Furthermore, Aichi biodiversity target 18 states that by 2020, *the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.*

[10] *Traditional Knowledge key in achieving Africa's climate goals,* CEESP News, https://www.iucn.org/news/commission-environmental-economic-and-social-policy/201901/traditional-knowledge-key-achieving-africas-climate-goals

V. Transmission: Recovering, revitalizing, and passing on traditional knowledge

The transmission of traditional knowledge of the natural world requires efforts on multiple fronts: attention to language, but also non-linguistic modes of transmission, innovative schooling and curricula, national and international policy frameworks, and network building among groups to encourage vertical and horizontal transmission of traditional practices among communities, for example in the cultivation of native foods and fire management.

Traditional knowledge is most comprehensively transmitted by elders to youth and children. However, **formal education** and social media have obscured oral transmission of traditional knowledge from elders. There are fewer opportunities, especially for children, to spend time with and learn from parents, grandparents and others who are knowledgeable about environmental conservation practices and beliefs. Culturally significant and environmental education programs can counter these losses as can hands-on activities and practices on traditional grounds, and/or field sites of rare and endemic species. Outdoor classrooms that emphasize connection to place and connect children to an oral history are used as a modality to decolonize the education system in Canada and Australia, and to teach biodiversity conservation to local communities in the Bahamas. These practices aid retention through direct experience.

Languages are the vehicle through which traditional knowledge is encoded, expressed and transmitted. Safeguarding linguistic diversity is fundamental to the protection of traditional knowledge. People who no longer speak in their mother tongue have limited access to traditional knowledge and are likely to be excluded from vital information about subsistence, health and sustainable use of natural resources. Therefore, linguistic diversity also plays a central role in linking cultural and biological diversity. It also plays a fundamental role in well-being. Yet, it is estimated that one language goes extinct every 3.5 months and that 3134 of the 6901 known living languages are endangered. At least 150 of the 250 Aboriginal languages in Australia have been lost since European colonization in 1788, and today, only 60 of them are still considered healthy [11].

In **Canada**, native languages are making a comeback as Indigenous youth are pushing culture and language to the forefront of their activism. 45 per cent of on-reserve Indigenous youth consider learning a native language a priority and over half of them can speak or understand one.[12] There is a wave of young people who want to learn or retain their native language. A report from the British Columbia Language Initiative[13], which seeks to revitalize the first nation languages stated that the majority, or 70%, of First Nations youth who reported having "excellent" First Nations language skills also reported high levels of life balance (a composite of physical, mental, emotional, and spiritual well-being).

This emotional well-being is critical for Indigenous youth as they continue to face challenges from the intergenerational effects of colonization and assimilation policies on their communities and families, and the struggles they encounter to ensure their rights and identity as indigenous peoples are respected. Indigenous youth for example, experience much higher rates of suicide and self-harm compared to non-

[11] https://aiatsis.gov.au/explore/articles/indigenous-australian-languages.
[12] https://www150.statcan.gc.ca/n1/pub/89-656-x/89-656-x2015001-eng.htm
[13] http://www.fpcc.ca/language/Programs/BCLI.aspx

indigenous youth as well as illiteracy and school drop-out rates. This heightened awareness and interest coupled with government legislation is leading to a resurgence in learning native languages. In December 2016, Canadian Prime Minister Justin Trudeau announced that the federal government would develop legislation to support the revitalization of Indigenous languages in the country. In his announcement, he stated that, "*our government will enact an Indigenous Languages Act, co-developed with Indigenous Peoples, with the goal of ensuring the preservation, protection, and revitalization of First Nations, Metis, and Inuit languages in this country*.[14]" In February 2019, an Act respecting Indigenous languages was tabled in the Canadian House of Commons.

In the arena of **digital technology** innovative products have been designed that prioritize the knowledge holders and revitalize how knowledge is transmitted. Indigital Storytelling is one such example. Indigital uses augmented reality- *a technology that superimposes a computer-generated image on a user's view of the real world, providing a composite view*- to tell stories of Aboriginal peoples in Australia[15]. Developed in close consultation with the knowledge holders, once downloaded the user opens the app, points their phone or tablet at pre-programmed symbols, objects or sacred sites and a 3-D animation will start to tell the story associated with that object. Indigital is using technology to help preserve culture and is passing on stories, art and language using a means that is embraced by the younger generations.

In the **Pacific**, traditional knowledge of climate, weather and environment, as well as traditional methods and indicators for forecasting weather are abundant. The Indigenous Peoples of the Pacific developed a vast body of knowledge about the ocean and seafaring. They navigated the ocean guided by stars, winds, waves and the behavior of birds, fish and whales. Indigenous navigation in the Pacific, or wayfinding, is an ancient craft, which has come very close to being lost forever in parts of the Pacific. UNESCO's Local and Indigenous Knowledge Systems LINKS Programme developed *The Canoe Is the People: Indigenous Navigation in the Pacific* to contribute to the preservation and development of traditional knowledge of non-instrument navigation, canoe building and open-ocean voyaging in the Pacific. The *Canoe Is the People* is a learners' resource pack, including a website, an interactive media CD-Rom kit and accompanying curriculum in English and Maori. The CD-ROM provides information on indigenous knowledge of navigation, the ocean environment and builds awareness and pride among Pacific youth about their unique intellectual tradition. UNESCO has also worked with curriculum experts from Tonga and New Zealand to finalize a Teaching Resource Pack. The program contributes to one of the main goals of the LINKS Programme, which is to bring Indigenous knowledge into the formal education system[16].

The **Tsimané** living in a lowland region of Bolivia provide an example on the profound impact the loss of traditional knowledge can have on a community that is integrating into non-indigenous societies. The Tsimané rely on their knowledge of local plants for construction, tool-making, medicine and food. Researchers recently assessed the health of 330 Tsimané children, aged 2-10, and tested their mothers and fathers on both their knowledge about local plants and their skills at using them. The findings

[14] http://www.fpcc.ca/language/Legislation/
[15] https://www.indigital.net.au.
[16] https://en.unesco.org/links-transmission/canoe.

revealed that children with plant-savvy parents – mothers in particular – were much healthier than those with less plant-savvy parents. Children from the less plant-savvy parents had higher levels of an immune system chemical called C-reactive protein, which accumulates in the presence of frequent infections.[17] They had smaller fat reserves to draw on for growth or fighting off disease, which makes them more likely to have stunted growth, a sign of infections or malnutrition.[18]

Women play a key role as the main transmitters of traditional knowledge within their communities. They are regarded as the main caregivers, but also the holders and custodians of traditional knowledge and culture. Women share their learning with their children. This knowledge can range from methods of biodiversity conservation and sustainable use of resources to warning signs deriving from natural phenomena. Women are frequently the primary managers or collectors of natural resources such as drinking water, fuel, and medicinal plants. For example, women's knowledge of wild vegetables- an important component of traditional food systems- is key to food security and nutrition for their families. In the case of the Pilcaniyeu community in southern Argentina, women play a predominant role as the principal transmitters of traditional knowledge related to horticultural practices[19]. Women are generally the ones in charge of home-gardens and share their knowledge, for example, in following moon cycles, the elaboration of natural herbicides, and the collection of seeds. For children the transmission of this knowledge begins in the early stages of childhood following their mothers. African women possess knowledge which helps to maintain household food security, in times of drought and famine. They develop coping strategies, such as relying on plants and crops more tolerant to droughts to secure food for the household during periods of increased hardship. In India, Adivasi women's knowledge is important for forest conservation, as they know exactly which type of product to collect depending on the season and the time of the day in order not to overexploit the forest. [20] Capturing and managing these practices owned by women is therefore critical for both transmitting and sustaining traditional knowledge across generations.

VI. The co-production of knowledge: bridging science with traditional knowledge

The long-term success of securing sustainable environmental management and resource use, hinges on a pluralistic and interdisciplinary course of action. The co-production of knowledge informed through partnerships between traditional knowledge holders and scientists can produce new knowledge that has the potential to address the challenges of today like climate change. A respectful two-way collaboration can provide new and important perspectives to a problem. It enables the sharing of information, enhances dialogue, facilitates network building, and leads to greater resilience. Bridging science with traditional knowledge systems can lead to approaches that can more accurately and coherently address social and ecological challenges.

[17] *Ethnobotanical knowledge is associated with indices of child health in the Bolivian Amazon*, McDade TW[1], Reyes-García V, Blackinton P, Tanner S, Huanca T, Leonard WR; *Loss of traditional knowledge in the Amazon leads to poorer child health*, Ed Yong

[18] Ibid.

[19] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2614966/.

[20] http://medind.nic.in/ibl/t11/i3/iblt11i3p226.pdf

Indigenous reindeer herders of the Arctic are facing major challenges related to a changing climate and the incursion of oil and gas infrastructure development on their land. Changing weather patterns- such as increased rainfall, longer autumns, shorter winters, unseasonal snowstorms in addition to the effects of mining, oil spills, the construction of roads and pipelines are altering and degrading pastures essential for the survival of their reindeer. Indigenous communities of the Arctic have come together to address these issues integrating their traditional knowledge, which is based on adaptive and resilient strategies learnt from the practice of seasonal migrations -with information systems and scientific research provided by NASA[21].

The EALAT project *Reindeer Herding in a Changing Climate* was initiated by the Association of World Reindeer Herders[22]. The project assessed the vulnerability of reindeer herding through an interdisciplinary and intercultural approach. Project partners sought to empower Indigenous Peoples with the best technologies available and combine them with Indigenous knowledge. The collaboration between indigenous communities and NASA has created a co-production of knowledge for the sustainable development of the Arctic. It enables communities to use earth viewing satellite imagery, Geographic Information Systems to develop monitoring systems and risk mapping that enhances the capacity to adapt to environmental variability and change. The traditional knowledge enriches and validates the satellite data and provides a more thorough picture of the information.

Unlike past studies in which traditional knowledge has been added (or not) to scientific studies or studies in which Indigenous People were often the subject of the research; the EALAT project team ensured Indigenous reindeer herders led this study, and invited scientists and other colleagues to collaborate, creating a partnership based on mutual respect[23].

In Australia, the **International Savanna Fire Management Initiative (ISFMI)** provides another example of a collaboration that harnesses traditional practices with modern science, and a methodology that can be replicated in other regions[24]. Across the globe, wildfires pose a major threat to human lives, health, biodiversity and economies. Wildfires are also a major driver of forest degradation and desertification. The history of wildfire is similar across the world. In Australia, originally fire regimes were intricately managed by Indigenous people who lit low intensity fires for multiple purposes: creating fire breaks and preventing the build-up of fuel loads, increasing the productivity of the landscape and protecting cultural sites. With colonization, these traditional ways of fire management have been suppressed across landscapes leading to increased late dry season hot fires or destructive wildfires, and vast areas of land being poorly managed and degraded. This situation has led to exploring new ways of combating wild fires and rediscovering the efficacy of traditional methods.

Indigenous communities in Australia have developed a solution to this threat and Indigenous people across northern Australia have been leading the way. Combining their traditional knowledge with modern science and technology, they burn early, keep fuel loads down and reduce destructive wildfires. This leads to a decrease in greenhouse gas emissions, which in turn provides carbon market

[21] https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20080041555.pdf
[22] http://reindeerherding.org/projects/ealat/.
[23] http://reindeerherding.org/wp-content/uploads/2013/06/EALAT-Final-Report.pdf
[24] http://isfmi.org.

opportunities. Today, traditional fire management is practiced across northern Australia on a range of tenures including indigenous lands, conservation parks and pastoral leases. Currently, there are 74 registered savanna carbon projects covering 25% of northern Australia that have generated an industry worth more than $100 million. The twenty Indigenous-led carbon projects create more than 400 seasonal jobs within poor and remote communities, while at the same time reinvigorating traditional culture and improving biodiversity.

The International Savanna Fire Management Initiative has explored the feasibility of exporting its savanna burning methodology to Asia, Africa and Latin America and has found widespread interest. This methodology could deliver the types of outcomes seen in Australia, such as market-based mitigation and adaptation, as well as economic and social benefits for communities in fire prone landscapes around the world.

The integration of traditional knowledge in **disaster risk reduction** is also worth highlighting as it has played a part in the mitigation efforts for natural disasters, and in early warning and response. Traditional knowledge includes various forms of traditional indicators to predict weather and climate and to respond to climate risks. Following the December 2004 tsunami there were reports of how traditional communities were alerted to its impending arrival and were able to escape from its impact.

In 2004 when the Indonesian tsunami hit the island of Simeuleu near West Aceh, people cried *Smong Smong* the local word for a tidal wave as soon as the earth stopped shaking[25]. The islanders, mostly from the Nias people, began heading to the mountains. The islanders had heard a song about *smong* passed down by parents and grandparents after the island was hit by a tsunami in 1907. The song's message was, *when there's a strong earthquake, followed by a low tide, don't go near the coast to collect the fish on the shore, because there will be a [tsunami]. When that happens, run to the mountains to save yourselves. Take your kids, parents, and women to run away from the beach. Yell out, smong, smong*[26]*.*

The absence of tsunami fatalities among indigenous communities in the Andaman and Nicobar Islands was a result of their ability to read early warning signs given by changes in the behavior of bird and marine species as the tsunami approached. The Onge tribe, for example, have lived on Little Andaman for between 30,000 and 50,000 years and, though they are on the verge of extinction, almost all the 100 or so people left survived the 2004 quake and the devastating waves which followed[27]. Their stories also speak of *huge shaking of ground followed by high wall of water*.[28]

Based on acute observations and readings, the Maasai in Tanzania can identify clouds that bring heavy rains or that warn of droughts. Clouds are not only indicators of rains, but also of the arrival of certain insects, and the migration of animals. Likewise, in Rajasthan, India, tribal people can predict floods by noticing changes in the color of the clouds, and the activities of animals. In Tanzania, Maasai community forecasters are seeking ways to work together with national weather bodies.

[25] https://foreignpolicy.com/2018/10/15/indonesias-indigenous-languages-hold-the-secrets-of-surviving-disaster/ .
[26] Ibid.
[27] https://www.survivalinternational.org/tribes/onge.
[28] http://news.bbc.co.uk/2/hi/south_asia/4181855.stm

Since the 2004 tsunami in Southeast Asia, the UN Office for Disaster Risk Reduction[29] has identified disaster risk reduction practices and strategies embedded in traditional knowledge that can be transferred and adapted to other communities. These practices are also being incorporated in existing policies and triggering further analysis on the importance of traditional knowledge in future policy making and curriculum development.

VII. Documentation and protection of knowledge: new technologies and networks

Documenting traditional knowledge is a tool which can play a role in impeding further loss of traditional knowledge, maintaining traditional knowledge over time, supporting benefit-sharing and protecting traditional knowledge from unwanted uses. Documentation also raises concerns over rights, disclosure, consent, ownership, and legal protection that need to be addressed before opening a wealth of traditional knowledge to those outside the community.

Today's **new technologies** play a significant role in documenting knowledge and in empowering people and communities with tools and information that can help them protect their lands, their culture and know-how. The emergence of digital technology in the last ten years and its ability to record and disseminate information quickly and widely presents both opportunities and concerns for Indigenous Peoples.

The tools and devices (i.e. drones, Geographic Information Systems, smartphones) allow Indigenous Peoples to map, survey, measure, and track their territories and land use. The Wapichana of the southern Rupununi savannas of Guyana use drones to map and monitor land aerially to cut the risks faced by those exploring remote areas of land threatened by illegal activity[30]. The Dayaks in Setulang, Indonesia do the same in the hope of protecting their lands from logging and clear cutting.

Conversely, the same technology and similar data can be used for the exploitation of natural resources. Indigenous Peoples' sacred sites and deep millennial cultural knowledge and data could also be disclosed and documented without their involvement and consent. Ethical digital use and digital sovereignty is increasingly an issue of importance and one that may need a guiding framework.

Other available technologies can also be incorporated to protect traditional knowledge. Block chain technology for instance, can ensure the traceability of high value natural resources. Resources can be traced from the source of origin to the final user. Given the challenge of tracing genetic resources, and associated traditional knowledge, once they have left the country of origin, and ensuring that benefits are shared from their utilization, blockchain technology could contribute to providing a possible solution.[31]

In India, the **Honey Bee Network** identifies and documents innovative grassroots practices and facilitates the exchange of that knowledge horizontally people-to-people[32]. It is a platform spread over 75 countries and is made up of a diverse set of actors from farmers and NGOs to academicians and

[29] https://www.unisdr.org/we/inform/publications/3646
[30] https://www.undp.org/content/undp/en/home/blog/2015/8/7/Knowledge-has-life.html.
[31] http://www.abs-canada.org/food-for-thought/blockchain-technology-and-access-and-benefit-sharing/
[32] https://www.facebook.com/HoneyBeeNetwork/

indigenous people. Honey Bee identifies the solutions developed by farmers to common problems, such as diseases in crops, pests, and the conservation of soil and water. Farmers create new kinds of farm implements and are involved in methods to store grains, conserve land races and local breeds of livestock. These innovations contribute to the conservation of local resources, and/or the generation of income. Honey Bee's goal is to offer products which can be either commercialized or disseminated directly among the farmers to reduce costs and move towards non-chemical sustainable agriculture and resource use. Examples of products and inventions identified by Honey Bee in India have been sold worldwide, like coconut tree climber in the USA, pomegranate deseeder in Turkey, and a milking machine in Philippines.

The Honey Bee Network holds a large database of local innovations from around the world. More than 1,000,000 ideas, innovations and traditional knowledge practices (shared in vernacular languages mostly from India) have been collected over the last twenty years[33]. This kind of exchange makes a practice in Mongolia, published in Honey Bee, available and useful to an indigenous community in Canada, for example.

Considerable attention has been given to the problem of identifying and safeguarding the intellectual property rights (IPR) of individuals, families and communities that are the source of much new knowledge. While collecting knowledge from the knowledge holder, Honey Bee acknowledges the knowledge provider with name and reference. This protects the IPRs of the knowledge provider. Knowledge is collected and credited to them and any benefit that arises from that knowledge is shared fairly with them. These have been the guiding principles of Honey Bee, which are non-negotiable and fundamental to the functioning of the network. But most importantly, Honey Bee challenges the notion that knowledge is held in academia, international or scientific institutions.

VIII. The protection of traditional knowledge and the current Intellectual Property regime

The **CBD and its *Nagoya Protocol*** provide important protections for traditional knowledge as highlighted by the Interagency Support Group paper to this meeting. Articles 6.2, 6.3(f) and 7 of the *Nagoya Protocol* provide that in accordance with domestic law, each Party shall take measures, as appropriate, with the aim of ensuring that genetic resources and traditional knowledge associated with genetic resources held by Indigenous Peoples is accessed with their prior and informed consent and that mutually agreed terms have been established. Article 12.2 calls upon Parties, with the effective participation of the Indigenous and local communities concerned, to establish mechanisms to inform potential users of traditional knowledge associated with genetic resources about their obligations, including measures as made available through the Access and Benefit-sharing Clearing-House for access to and fair and equitable sharing of benefits arising from the utilization of such knowledge. Article 12.3 requires Parties to support, as appropriate, the development by Indigenous and local communities, including women within these communities, of:

[33] http://nif.org.in.

(a) Community protocols in relation to access to traditional knowledge associated with genetic resources and the fair and equitable sharing of benefits arising out of the utilization of such knowledge;

(b) Minimum requirements for mutually agreed terms to secure the fair and equitable sharing of benefits arising from the utilization of traditional knowledge associated with genetic resources; and

(c) Model contractual clauses for benefit-sharing arising from the utilization of traditional knowledge associated with genetic resources.

Unfortunately, implementation of these obligations is slow. The first review of the *Nagoya Protocol*[34] made at the last meeting of the governing body of the *Nagoya Protocol* in November 2018 found[35] that:-

(a) only 23 Parties where indigenous peoples have the established rights to grant access to genetic resources with measures in place with the aim of ensuring the prior informed consent or approval and involvement of Indigenous Peoples;

(b) 21 Parties that have taken measures with the aim of ensuring that TK have been accessed with the prior informed consent and that mutually agreed terms; and

(c) There was no conclusive data on the number of IP protocols and procedures developed nor on the number of customary laws, community protocols and procedures made available in the ABS Clearing-House.

The World Intellectual Property Organization -WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC) is developing "an agreement on an international legal instrument(s), without prejudging the nature of outcome(s), relating to intellectual property which will ensure the balanced and effective protection of genetic resources (GRs), traditional knowledge (TK) and traditional cultural expressions (TCEs)." The current draft of that instrument (Draft Articles Rev. 2) provides text for many elements of interest for the protection of traditional knowledge. Article 5 of the draft, which deals with the scope of and possible conditions of protection to be provided, centres around a tiered approach where different rights result from different levels of diffusions of traditional knowledge namely secret, narrowly diffused and widely diffused. In the draft Articles there are also references to:

a) Database Protection
b) Complementary and Defensive Protection
c) Disclosure Requirement
d) Extensive exceptions and limitations

There remain many and significant differences of view about all of these issues in the current draft. The next meeting of the IGC (40th meeting in June 2019) is the last meeting of the IGC before the General

[34] https://www.cbd.int/decision/np-mop/default.shtml?id=13408.
[35] https://www.cbd.int/doc/decisions/np-mop-03/np-mop-03-dec-01-en.pdf.

Assembly of WIPO review the mandate of the IGC. It is hard to see how these issues can be resolved in one more meeting.

Compared to the existing obligations that States have under the *Nagoya Protocol,* even if the negotiations are successful, and the new instrument enters into force its impact on Indigenous Peoples and the use of their traditional knowledge will likely be limited.

More promising is the recent consultation being undertaken by IP Australia. The Australian Consultation Paper September 2018,[36] which asks for comments about the following:

a) Certification trademarks;
b) Geographical Indications (GIs);
c) Standardise research protocols and guidelines;
d) Develop and promote standard research and commercialisation agreements to vest Traditional Knowledge rights with traditional owners;
e) Include free, prior and informed consent as a requirement for Australian Government-funded research programs;
f) Develop a national database of Traditional Knowledge and genetic resources
g) Disclosure of source requirement; and
h) Provide training and legal support.

The comments made on these proposals were all positive and supportive. Supporting this consultation is a detailed background paper *Indigenous Knowledge: Issues for protection and management Discussion Paper* by Terri Janke and Company Commissioned by IP Australia & the Department of Industry, Innovation and Science.[37] This paper provides detailed and relevant information for the discussion of these issues here. It is worth highlighting some of the conclusions of this paper as they are relevant to the discussion taking place within the Permanent Forum on Indigenous Issues. A recurring feature raised in the case studies highlighted in this paper and the Discussion Paper is the fundamental principle of FPIC. FPIC confers on Indigenous Peoples the right to participate in decisions that affect them and is essential to the exercise of the right to self- determination. Even though it is widely recognized that Indigenous Peoples must provide their free prior and informed consent for use of their knowledge, there remain challenges with ensuring FPIC. Often, those who wish to use indigenous knowledge are challenged about how to meet the free prior and informed consent requirements. This results in Indigenous consultation and consent efforts that are, while extensive, largely fragmented, *ad hoc* and implemented on an individual, case-by-case basis.

Many strategies have been developed to address these problems. Protocols, codes, guidelines, the use of Indigenous authority systems, contracts, funding and assistance programs, and education and awareness programs offer different levels of protection for traditional knowledge. Protocols have gained recognition as a major way of protecting traditional knowledge, especially where legal mechanisms do not offer enough protection. They are widely used to increase awareness of issues, understand consultation and consent concepts, set minimum benchmarks for acceptable behavior when dealing

[36] See https://www.ipaustralia.gov.au/about-us/public-consultations/indigenous-knowledge-consultations.
[37] Available at https://www.ipaustralia.gov.au/sites/default/files/ipaust_ikdiscussionpaper_28march2018.pdf.

with traditional knowledge, and address issues such as recognition and respect of Indigenous culture and rights, self-determination, and free prior and informed consent.

IX. Some considerations for the Forum to move forward

It is tragic that as traditional knowledge is increasingly recognized and valued it is also being lost. Even so, the cases outlined in this paper demonstrate that Indigenous Peoples are keen to use, share and protect their traditional knowledge. However, the exploitation of their traditional knowledge through lack of equitable sharing, and their lack of experience and guidance are hampering their ability to do this.

In the absence of strong policy and law supporting Indigenous Peoples, the following are key principles derived from the experiences in working with traditional knowledge and Indigenous Peoples outlined in this paper:

a) FPIC is a corner stone
b) The how is more important than the decision
c) Trust and respect
d) Supporting meaningful participation
e) Sustained commitment

Most importantly, linking and networking the emerging body of successful global experience would promote Indigenous leadership and enterprise, provide valuable ideas for mainstream education, training and research, and develop more effective interventions. This is best led and implemented by Indigenous Peoples themselves using their institutions. There are several prominent and capable Indigenous organizations that could do this, like the Honey Bee Network and the Association of World Reindeer Herders. All that is missing is the funding to allow these organizations to develop the network.

Key needs neglected in the numerous initiatives underway that require further urgent attention include:

- **Host regional meetings** on indigenous women and traditional knowledge. Actions are needed to: i) increase Indigenous women's visibility and capacity, ii) recognize their role in traditional knowledge transmission, iii) enable their participation in decision-making processes related to environmental management at the local and national levels, and iv) support Indigenous women's knowledge exchange to address development challenges.
- **Host regional meetings** on youth and traditional knowledge**:** action is needed to identify and design modalities that develop capacity of future leaders in advocacy, skill building and knowledge sharing.
- **Convene an expert group meeting** on traditional knowledge: generation, transmission and protection to network the body of successful global experience and address emerging issues.
- **Develop guidelines**, tools and training courses on the use of digital technology and Indigenous Peoples.
- **Conduct research** on autonomous Indigenous territories and Indigenous and community conserved areas (ICCAs) and their impact on protecting, transmitting and generating traditional knowledge.
- **Study** on innovative methodologies for revitalizing native languages among youth.